ELSEVIER

Landscape and Urban Planning 40 (1998) 113–122

LANDSCAPE AND URBAN PLANNING

Evolution of USDA Forest Service organizational culture and adaptation issues in embracing an ecosystem management paradigm [1]

James J. Kennedy [a,*], Thomas M. Quigley [b]

[a] *College of Natural Resources, Utah State University, Logan, UT 84322-5215, USA*
[b] *USDA Forest Service, Pacific Northwest Experiment Station, La Grande, OR 97850, USA*

Abstract

This paper examines how the USDA Forest Service (USFS) adapted to the changing needs of American society in its industrial (about 1900–1969) and post-industrial (1970 up to present) stages of socio–economic development. Several marker events in Forest Service adaptation to a post-industrial American society are examined (e.g., Bitterroot clearcutting controversy). These events illustrate American cultural changes that have moved the agency toward its current 'ecosystem management' era of organizational evolution. Shifts and trends in agency values, policies, structures and operation to embrace and implement ecosystem management are examined. © 1998 Elsevier Science B.V.

Keywords: Natural resource or environmental values; Natural resource or environmental policy; Environmental management; Professional subcultures

1. Introduction

By most power, size and budget measures, the USDA Forest Service (USFS) has been a very successful organization (e.g., Gold, 1982; Clarke and McCool, 1985). This is especially true in the first two-thirds of this century, when its conservation era mission and management style were so compatible with an urbanizing, industrial nation that was immersed in three major wars and a great depression (Gulick, 1951; Hays, 1959; Kaufman, 1960). But the Wilderness (1964) and National Environmental Policy (1969) Acts signalled the advent of the post-industrial environmental movement and more democratic public involvement. This proud and nationally respected agency, that then starred in the prime-time *Lassie* TV series, was about to write its own chapter of *Future Shock* (Toffler, 1970) in adapting to the values of an urban, post-industrial America (Kennedy, 1985, 1988).

Even with all the inertia of a proud and successful bureaucracy, its traditional client loyalties, and changing priorities of the last five presidential ad-

* Corresponding author. Tel: +1-435-797-2573; fax: +1-435-797-4040; e-mail: jkennedy@cc.usu.edu

[1] A less comprehensive and more issue-focused version of this article was originally published in M.E. Jensen, P.S. Bourgeron (Eds.), 1993. Eastside forest ecosystem health assessment: ecosystem management, principles and applications, Vol. II. USDA Forest Service, Washington, DC.

PII S0169-2046(97)00103-5

ministrations, the tide of *external* socio–political change (Kennedy and Thomas, 1995) and *internal* agency diversification (Kennedy, 1991) has been moving the USFS toward the current era of 'ecosystem management'—announced by Overbay (1992). The 104th, Republican controlled Congress challenged this agency evolution. But regardless of the multiple-use output priorities in the next several years, we believe that national forests will be more and more envisioned and managed in a broad, inclusive, integrated eco- and socio–economic system context that reflects our complex, interrelated ecosystems and our post-industrial world.

Our paper (1) describes several stages of USA and USFS socio–political evolution in this century; (2) examines how its organizational culture is and is not positioned to embrace and implement ecosystem management values and goals; and (3) suggests several organizational changes necessary to implement this new management paradigm.

2. Developmental stages of Forest Service organizational culture

Any attempt to characterize 100 years of USFS history in a few pages will reflect our personal views and frequently over-generalize. Yet we will attempt an overview of USA socio–economic change and USFS organizational evolution in three stages, summarizing this with a 1950s vs. 1990s comparison of changing internal and external USFS environments.

2.1. Stage I: Forest Service birth and establishment (1880s–1909)

In the last two decades of the 19th century, the American frontier closed and the USA became an urbanizing, industrial nation. With growing political concerns about forest fires, flooding, wood scarcity and the long-term socio–economic risks of the free enterprise system, what was to become the USFS (in 1905) emerged. The National Forest System was the United State's biggest experiment with socialism at the time. National forests were to be an insurance annuity or alternative, *not* an echo, to free enterprise system values, time perspectives and methods of forest management. They were designed to be a multi-value (vs. single), long (vs. short) term focused, socially (vs. profit) oriented natural resource *trust fund* for the entire nation and, especially, for future generations.

The first strong chief of the agency (Gifford Pinchot) largely adopted the forest and organizational models, values, and management processes of German-model forest services (Twight, 1983, 1985). The agency's regimented campaign against the evils of forest fires, short-run greed and natural resource exploitation, plus its promises of long-term sustainable commodity flows for an emerging industrial state, gave it noble purpose and broad socio–political appeal (Hays, 1959; Steen, 1976). The USFS was out in front, defining and leading American people and politicians into the conservation era. It was a lean, righteous, radical, 'Naider's raiders' type organization, confronting frontier era and laissez faire natural resource values that were no longer appropriate for a modern, industrializing America.

2.2. Stage II: Forest Service adolescence and young adulthood (1910–1969)

The USA became an urban industrial state with a great depression and three major wars to provide a clarity of purpose for the nation and its USFS; a national clarity of purpose that would soon evaporate in the 1970s. The agency and its employees were seen as clean-cut heroes, fighting forest fires and natural resource ignorance or exploitation (Frome, 1962). However, the organization changed from rebels against the system to becoming a proud and powerful part of 'the system' itself. By the 1950s it was no longer a small fraternity of dispersed and independent tough-guys, but an elite (and often aristocratic) professional forester bureaucracy that responded harshly to outside criticism (Reich (1962), for example).

Just as the USA was becoming an urban, post-industrial nation, with emerging environmental values, post-WWII demands had liquidated enough private softwood supplies to create political and economic pressures to harvest more national forest timber. Consistent with its German intensive forest management values, desires to contribute to rural growth and national prosperity, in the heady era of 1950s GI Bill and home ownership patriotism (McGee, 1910;

Twight, 1983; Clary, 1986), the USFS made a Faustian bargain in the early 1950s to shift from forest protection and custodial management to becoming a major player in national softwood timber supply. Its timber harvest jumped almost 800%, from 1.5 to 11.5 billion board-ft./year, between 1941–1971 (Steen, 1976: 314). This shift in role of western national forests from a resource trust fund to becoming a regional employment 'lunch bucket' (within sustained yield and multiple-use constraints, of course) had its organizational rewards. For example, the agency budgets and work force grew rapidly (e.g., a 40% increase in employees between 1958 and 1963; Aiken et al., 1982). But this new organizational identity and power, western economic and regional political coalitions, and commodity budget priorities (Alston, 1972) would put the agency on a collision course with the environmental values of an emerging post-industrial and post-modern American society (McQuillan, 1992).

In those heady, 1950–1960s developmental years, the USFS, Congress and several presidential administrations that guided it would often forget the original national forest pledge to American society living and, especially, those yet to be born. Rather than a trust fund alternative and a counter-balance to free enterprise forest/grasslands management, the USFS often looked and behaved like an echo.

2.3. Stage III. Mid-life crises and struggle for a new Forest Service maturity (1970 up to now)

The shift in public perception and use of national forests toward recreational, wildlife and landscape values of the 1960s was initially indicated in the Wilderness Act (1964). A legislative 'last hurrah' for intensive national forest timber management was initiated and defeated in that period as well, when Congress rejected a proposed National Timber Supply Act. This law would have allowed the USFS to keep much of its timber sale receipts to invest in more intensive, scientific timber management, so that national forests might be managed more like productive, Wegerhauser tree farms.

The National Environmental Policy Act (NEPA 1969) began the environmental era, with legislation requiring development alternatives and justification of federal action significantly impacting the environment. These alternatives were to be analyzed by an interdisciplinary team of diverse professionals and integrate public participation into the process. In the next two decades, the USFS would go through stages of denial, confusion and mourning for the good-old-days of an elite, white, male forester fraternity—with clarity of purpose and a supportive national mystique (so well described by Greeley (1951), Kaufman (1960) or Frome (1962)). It would also receive mixed messages from conservative administrations and commodity oriented budgets (renewed in the recent 104th Congress) versus growing environmental demands of a post-industrial American society and its own employees. Yet through all of these mixed messages has been a tide (inside and outside the USFS) moving the agency in the direction of environmental values and a multiple-use maturity signified in the ecosystem management paradigm (Overbay, 1992)—an organizational evolution well diagnosed by such traditional client groups as the National Forest Products Association (Gladics, 1991). These agency changes are highlighted in Section 3.

3. Forest Service paradigm shifts: a 1950 vs. 1990 snap-shot

A comparison of 1950 vs. 1990 events, values and USFS management paradigms is condensed in Table 1. It highlights the contrast and tension between today's complex world and the heady 1950–1960s era of USFS 'manifest destiny'—when western national forests were to be transformed from an inaccessible, extensively managed, native forest into the triumph of the conservation era (a roaded, intensively used and managed multiple-use forest estate--which would approach the vision of an initial agency prophet, McGee (1910)). Underlying these 1950s conservation era values, images and metaphors was a fascination with (what we will call) a machine-model view of forests, the USFS organization, its employees, and much of the rest of the world (see Table 1, dominant models and metaphors). This simpler, machine-model view of reality is challenged today with more diverse, complex organic-models of *Work Force 1995* (USDA Forest Service, 1987), NEPA processes, or ecosystem management. Yet there is some intellectual appeal and immediate local

Table 1
Forest Service (USFS) and National Forest (NF) environment, images, values and management paradigm-shifts toward ecosystem management (EM): 1950 vs. 1990 snap-shots

Elements	Contrasting decades of 1950s	1990s
Stages of USA socio–economic development	· triumph of the USA industrial state in post-WWII euphoria	· urban, post-industrial society in a competitive global economy and complex, sobering times
FS mottos and orientation	· 'Land of Many Uses'—but timber usually has the major use and ROTT (resources other than timber) are secondary considerations or constraints	· 'Caring for the Land and Serving People' (USDA Forest Service, 1986) · shift from ROTT to legitimate multiple-use and ecosystem management
	· sustainable goods and service flows (sustained-yield *output* focus)	· sustainable ecosystems (focus on *health* and *uniqueness* of system *itself*)
	· heavy road development for access and fire control	· road and infrastructure developmental era waning
	· intensive timber management focus	· shift from resource-stuff focus to multiple social values (Kennedy and Thomas, 1995)
	· fascination with technology (machines, chemicals, genetics)	· questioning dominance of technology in management innovation and efficiency
Respected NF management models	· adopted European intensive forest management paradigm	· search for own, new unique NF management paradigms and community-based identities
	· primary focus on maximum output efficiency, within sustainability and multiple-use constraints	· focus first on healthy, diverse, sustainable ecosystems, then estimate output possibilities
	· a kinder, gentler, multiple-use conifer plantation is often the vision for many NFs	· desired future NF conditions that contrast and complement public and private lands in regional context
Respected NF managers and FS role models	· era of independent, self-sufficient, great men	· era of interdisciplinary teams
	· benign professional aristocrat	· team leader, public and partner facilitator
	· John Wayne action and achievement-oriented, omnipotent forester (Behan, 1966)	· specialized expert, capable of inter-disciplinary or public communication, and power sharing
Dominant models and metaphors	· dominance of the simple, compartmentalized, *machine model* on land and in USFS organization	· more complex, inclusive, interrelated *organic-model* of ecosystems and USFS organization
	· simplicity, homogeneity of well managed forest stands and of the hard working, loyal 'forest rangers' (e.g., Kaufman, 1960)	· respect for diversity and uniqueness of land, individual USFS employees, user groups or partners
	· fascination with machine-model plantations, road networks, developed campgrounds	· birth of new perspectives era and evolution to EM
Dominant FS values	· action, can-do, development-oriented mythic heroes	· can't do and shouldn't do many things—let us think, plan, seek consensus before action
	· must dominate/control *forests*, *self* (especially emotional self), *family* (e.g., transfer-on-command), and the *public* ('educate' them if they do not support us)	· co-dependence and mutuality with *nature* (Rolston and Coufal, 1991), expanded image of *self* and *family* (multi-faceted lives, dual careers), and the *public* (public servant and partnership era, Magill, 1988).
	· dog loyalty to line and the organization (Kennedy and Thomas, 1992)	· USFS organizational loyalty counter balanced with loyalty to land, to profession, working spouses, etc.
Space focus	· focus on forest stands (or the research project)	· landscape and ecosystem-scale focus
	· local and regional focus	· regional–national–global thinking

Table 1 (continued)

Elements	Contrasting decades of 1950s	1990s
Time focus	· annual reports of specific target accomplishments	· movement toward achieving long-term desired future conditions
	· short run economic and project efficiency focus	· decadal focus needed; target myopia questioned
Land, labor and capital conditions	· public land per US and global population more abundant and less developed	· public land per US or global population more scarce and more developed
	· abundant capital from old growth forests and a deficit-naive Congress	· capital scarcity in second-growth and multiple-use oriented forests, plus a deficit-burdened society
User fee	· low, often subsidized, fees restricted to a few users (e.g., ranchers and some recreationists)	· likely to rise for traditional users and expand to others
Patron saints	· Gifford Pinchot (USFS employee: 1898–1910)	· Aldo Leopold (USFS employee: 1909–1928)
	· St. George, The Dragon-Killer	· St. Francis of Assisi

economic benefits in a more traditional, simple, commodity orientation, machine-model perspective.

It is not surprising that a very young industrialized USA and its Forest Service would be fascinated with a machine-model view of reality. This model views the world in rather simple, compartmentalized, cause–effect, goal-oriented and mechanistic terms, that can be understood separately by standard efficiency or optimization analysis (Taylor, 1957; Schiff, 1966). Such USFS machine-model thinking was manifested in: (1) narrow forest ecosystems perception (e.g., simple site productivity models); (2) forest or fire management (e.g., intensively managed plantations, forest pest wars, or out before 10 AM wildfire rules); (3) agency organizational structures (e.g., line–staff, generalist–specialists, or strict functionalism); (4) organizational processes (e.g., Kennedy and Thomas, 1992), 'dog loyalty' to line, mechanistic employee–spouse–children response to USFS transfers); (5) public relations (e.g., an educated, objective and benign agency professionals 'educating' the public on proper, scientific national forest management); or (6) functional, reductionist research scientists and their projects. Control-oriented people and organizations (Table 1, dominant USFS values) find comfort in viewing and living in a machine-model world (Schiff, 1966).

Ironically, complex post-industrial societies (created by the more simple industrial eras of the first two-thirds of this century) have made much machine-model thinking obsolete (Table 1, dominant models). More complex, diverse and interrelated organic-models are necessary to understand and adapt to today's world. This is true of public and private organizations, on both sides of the collapsed Iron Curtain. The disintegration of machine-model institutions in eastern Europe, the near extinction of Chrysler, or adaptation difficulties of Sears or IBM corporations are examples of simple, rigid values and organizations (in the communist or capitalist world) whose resilience is challenged by the complexity and rate of change of our modern world (Bennis, 1966). Such socio–political change also requires today's national forest managers to discard the illusion of control and mastery offered by simple machine-models of reality for the inclusiveness, validity and challenge of organic-models (such as ecosystem management), and to resurrect USFS employees Leopold and Marshall as respected role agency models along with Pinchot—recently done by chiefs Robertson (1991) and Thomas (USDA Forest Service, 1994).

Given the norms in which many of us natural resource managers were educated to become respected adults, professionals, and agency employees (i.e., rational, knowledgeable professional adults, in solid control of our internal and external worlds), this invitation to an organic-model of reality does not come without challenge, threat and uncertainty (Magill, 1988; Twight and Lynden, 1989). Yet, to ignore this invitation to change is not an option for

USFS employees far from retirement. The current USA political popularity of simple, production-oriented, laissez faire management of public lands, air and water notwithstanding, complexity denial is not a long run option for our nation as well.

The complex, diverse and interrelated forest/grassland ecosystems that we now know and respect, the diverse (professionally, sexually and ethnically) USFS and American culture of which we are part, and the laws/policies that direct the public land management (e.g., NEPA processes, National Forest Management Act or Affirmative Action directives) demand a more sophisticated, inclusive organic-model of the world and our place in it. This is true of foresters, wildlife biologists, personnel managers or engineers in the US, Danish, or Australian Forest Services. The New Zealand Forest Service, so successful with machine-model management of conifer plantations up until the 1970s, found it very difficult to accept organic-models of resource management that would have helped them adapt to the environmental values of an urban, post-industrial New Zealand society (Kennedy, 1981; Clawson, 1988). This inflexibility contributed to over 75% of New Zealand Forest Service lands (most of its native forests) being removed from their stewardship in the mid-1980s. New Zealand society judged a machine-minded forester profession and agency only trustworthy to manage their machine-model conifer plantations. Like Chrysler or the Russian Communist party, US or New Zealand Forest Services must constantly escape the anchors of their history and continuously re-invent a future relevant to changing socio–political and environmental realities—or disappear into the footnotes of history.

4. Forest Service adaptation to some wake-up calls in the last 25 years—prologue to ecosystem management

The USFS was internally directed to become a leader in the US conservation movement (1890–1970). The agency required considerable external socio–political stimuli to adapt from its conservation and resource development values to incorporate those associated with the environmental movement (e.g., wilderness, biodiversity, or outdoor recreation values). Several of these social or legislative wake-up calls (and cross-body blocks) are highlighted below, with implications for ecosystem management.

4.1. Case 1: Oops, we're not as technically competent and omnipotent as we once thought—Monongahela and Bitterroot National Forest controversies

In the Kaufman (1960) era, USFS professionals (viz., foresters) were educated in universities and socialized in the agency to view themselves as stewards of the public interest and broadly enough trained to manage *all* national forest issues (i.e., the 'omnipotent forester' by Behan (1966)). Conventional wisdom held that all professional foresters were surely competent silviculturalists.

The Bitterroot (US Senate, 1970) and Monongahela (Fairfax and Achterman, 1977) National Forests clearcutting and stand conversion controversies provided several lessons for the USFS (e.g., need for sensitivity to more diverse recreational, wildlife or landscape values; new public demands for shared decision space). The agency was alert to diagnose and respond to another lesson: all foresters were not, *ipso facto*, competent silviculturalists. Although the dark-side of the USFS can-do culture helped cause these two controversies, the concomitant bright-side of that attitude allowed the agency to quickly instigate a graduate-level training program to position and empower certified silviculturalists to guide, approve and monitor silvicultural practices on most national forests.

Today's agency adaptation lessons might be more complex. For example, much less obvious, cumulative climate, fire management and silvicultural factors have created 1990s eastside Oregon/Washington forest health issues. This is a more complex wake-up call than the Monongahela and Bitterroot issues, but it suggests similar agency responses. Namely, to: (a) consider functional budget and USFS specialist impacts in a more long-term, integrated, cumulative (organic-model) context; (b) recognize that ecosystems and associated socio–economic systems are composed of complex, integrated structures and processes that do not stop at public or private ownership boundaries; (c) accept that many line and staff specialists might not initially have the expertise and vision to adequately plan, manage and monitor

more demanding and sophisticated ecosystem management organic-models; and (d) consider that advanced trained, 'certified ecosystem managers' might be needed to direct and monitor landscape-scale ecosystems, cumulative effects, or the establishment and progress toward more stable, healthy, desired future conditions.

4.2. Case 2: Okay NEPA (1969) includes us, so let's settle most national forest conflicts at the planning stage

As with a lot of life's shocks, denial is an appealing first response. This was an initial USFS reaction to NEPA (1969), thinking the law might be directed to other agencies that really needed it—such as the Corps of Engineers. But Congress and the courts did not long allow that denial to persist.

In 1971, the USFS embarked on a new 'Unit Planning Program' to identify and resolve issues at the planning stage (versus on-the-ground management stages). In many ways, it was an initial agency organic-model adaptation to an increasingly diverse and complex ecological and socio–economic world. Planning unit boundaries were generally set by landscape ecological criteria—often crossing over district, national forest or political lines. Planning units were also referenced to larger national forest and regional policies, and to socio–economic and condition of adjacent public/private forests of the larger eco-regions. For example, the planning units on the Ouachita National Forest, AR, were directed by national (USDA Forest Service, 1970) and regional goals. *The Guide for Managing the National Forests in the Ozark Highlands* (USDA Forest Service, 1974) was an advanced and enlightened document that placed the Ozark and Ouachita National Forests in a large regional ecological and socio–political context. It proposed guidelines that emphasize 'vegetative diversity' (p. 38), favoring hardwoods over softwoods on appropriate sites (since adjacent private lands had a bias to pine plantations, p. 39), promoting undeveloped recreation on national forests while relying on adjacent private lands to provide more developed opportunities. If the Ouachita National Forest had followed this direction and not been driven by other targets, it might have avoided much of the legal and Congressional conflict it experienced in the last 15 years. That national forest would have been more of a forest social value *alternative* and less of an *echo* to private forest land management surrounding it.

Like ecosystem management, unit planning in the early 1970s was to focus first on analyzing the sustainable capabilities of landscape-scale ecosystems. It would provide a bottom-up estimate of national forest output capabilities secondarily. Concerns with initial unit plan output declines and new legislation (e.g., the Forest and Rangeland Renewable Act of 1974) largely reversed this bottom-up, community-based, ecosystem management-type planning process. Commodity output targets regained leverage and mechanistic, optimization machine-models (e.g., FORPLAN) drove the new forest planning paradigm. Large regional ecosystem issues (such as east-side Oregon/Washington forest health issues; Jensen and Bourgeron, 1993), court decisions and regional studies of spotted owls or salmon (e.g., Craig, 1987), recent Congressional agency studies (Office of Technological Assessment, 1990, 1992) and the advent of ecosystem management may now send the agency 'back to the future' to incorporate more bottom-up, landscape scale, ecosystem (the unit) planning philosophy and methods. For the planning process is an essential, pivotal entry point for such values and methods to impact USFS employees and lands.

4.3. Case 3: Forest Service soul searching at Snowbird (1985) and Sunbird (1989)

In 1985 forest supervisors, regional foresters, chief and deputies all met together for the first time in the agency's history at Snowbird Ski Resort, UT. A major agenda item of this 'summit meeting' was to develop a new agency vision statement. The result, *Caring for the Land and Serving People* (USDA Forest Service, 1986), incorporated verbs (e.g., 'caring' vs. the more traditional, clinical and macho 'management') and concepts (e.g., diversity) more consistent with current American social values. The ecosystem management-type goals of this vision statement are also more difficult to quantify and target than 'Land of Many Uses' values of earlier production and development-oriented goal statements (e.g., USDA Forest Service, 1970).

At the second ('Sunbird') meeting of forest supervisors, regional foresters, chief and deputies (Tucson, AZ, 1989), Kennedy and Quigley (1989) examined if top line officers at that conference and the recent generation of new professionals endorse these caring–serving values, and if they believe the USFS reward system supports its stated vision statement. This, and an expanded follow-up study (Kennedy et al., 1992), found solidarity from top line officers to recent agency recruits that they personally believe: (1) professional competence; (2) care/concern for healthy ecosystems; and (3) care/concern for future generations *should* be the most rewarded USFS values. However, most believed that standard bureaucratic values *were actually* the most rewarded by their agency; namely, (1) be loyal to organization; (2) meet targets; (3) promote a good USFS image; (4) follow rules/regulations; and (5) work well in teams. These employees and the ones surveyed by Quigley (1989) generally believed that their agency over-prioritized timber and grazing values (vs. recreation, water or wildlife), more than did they or the general public—a trend that new RPA strategic plans (USDA Forest Service, 1990, 1996) seek to reverse. The Sunbird survey and an open letter to the chief from several forest supervisors indicated broad internal concern for the USFS to become more true to its caring/serving mission and the similar values of its employees.

5. Conclusions: a Forest Service organization to embrace the letter and the spirit of ecosystem management

Overbay (1992) set forth comprehensive, diverse, organic-model direction for ecosystem management of all national forests or grasslands. It is a management paradigm worthy of a similarly organic-model 'caring for the land and serving people' vision statement (USDA Forest Service, 1986), for a more democratic organizational culture envisioned in the new agency management charter (USDA Forest Service, 1992, manual, title 1300), the innovation in many regional initiatives (e.g., USDA Forest Service, 1985, Region 9), and much new ecological thinking (e.g., Botkin, 1990; Diaz and Apostal, 1992). Given the tide of socio–political change in American society, plus the promises and expectations of the USFS New Perspectives initiative (Kessler et al., 1992), the USFS has no choice but to proclaim ecosystem management as its new management paradigm. It also has no choice but to embrace and implement its spirit.

Attempting to achieve and reward organic-model ecosystem management goals with agency machine-model planning systems, traditional organizational structures, highly targeted budgeting, or the existing employee reward system is likely destined for frustration and failure. Overnight, revolutionary change cannot be expected in the organizational culture of such a large bureaucracy as the USFS. But a clear strategy for organizational change and movement in that direction can maintain public and employee faith in an organization attempting to be responsive to recognized diversity and complexity in national forests/grasslands, in American society, and in its own work force. This occurred at the two-week conference on *A Scientific Framework for Ecosystem-based Stewardship of Federal Lands and Waters* (Tucson, AZ, 4–14 December 1995). It was a large, diverse, summit-type, working-conference of academic, interagency and non-government agency scientists and practitioners to define current knowledge and future needs in managing public ecosystems under a more comprehensive, inclusive, integrated system.

National forests/grasslands, the public, and USFS employees have *always* been complex and diverse. Viewing them in a machine-model context was a result of deficiencies in knowledge and sensitivities of the past, and unintentionally contributed to issues such as eastside Oregon/Washington forest health. Ecosystem management represents an organic-model maturity that more closely honors complex, diverse, evolving and interrelated *ecosystems*—and is consistent with the democratic inclusion and public land values of an urban, post-industrial American society. In addition, the proclamation to understand and honor the complexity, diversity and interrelatedness of *ecosystems* by Overbay (1992), must be expanded to embrace the equally complex, diverse and interrelated nature of *human socio–economic systems*, plus the understanding and management of equally complex USFS *employees* and *agency culture*. Not only national forest ecosystems, but USFS employees and

publics (those living and yet to be born) deserve better than traditional, machine-model values and action.

All of the changes we endorse or propose are founded on the need for the USFS to evolve from an output/target focused agency (within long run site productivity constraints) to an organization that enhances diverse, sustainable forest/grassland ecosystems (for regional-scale biological and socio–economic balance), that affords certain good-service privileges to society living—and to apply a similar level of awareness, sensitivity and skills to the public and to its own employees.

Acknowledgements

This paper was supported by the Utah Agricultural Experiment Station, MacIntire Stennis Project 712 (Journal paper 4437), Logan, UT 84322, and the USDA Forest Service, Pacific NW Forest and Range Experiment Station, Portland, OR.

References

Aiken, B., Glazer, M., Marine, T., 1982. 1981 Work Force Planning Data Book. USDA Forest Service, Washington, DC.

Alston, R.M., 1972. FOREST: Goals and Decision-making in the Forest Service (INT-128). USDA Forest Service, Forest and Range Experiment Station, Ogden, UT.

Behan, R.W., 1966. The myth of the omnipotent forester. J. For. 64, 398–407.

Bennis, W., 1966. Beyond Bureaucracy. McGraw-Hill, New York.

Botkin, D.B., 1990. Discordant Harmonies: a New Ecology for the 21st Century. Oxford Univ. Press, New York.

Clarke, J.N., McCool, D., 1985. Staking Out the Terrain—Power Differentials Among Natural Resource Management Agencies. State Univ. of New York Press, Albany.

Clary, D.A., 1986. Timber and the Forest Service. Univ. Press of Kansas, Lawrence.

Clawson, M., 1988. Public forests in New Zealand and in the United States, Paper RR 88-01. Resources for the Future, Washington, DC.

Craig, B., 1987. National forest planning and anadromous fish protection: a trilogy of NEPA cases. Environ. Law Litigation 2, 257–279.

Diaz, N., Apostal, D., 1992. Forest landscape analysis and design, R6 ECO-67P-043-92. USDA Forest Service, Pacific NW Region, Portland, OR.

Fairfax, S.F., Achterman, G.L., 1977. The Monogehela controversy and the political process. J. For. 75, 485–487.

Frome, M., 1962. Whose Woods Are These: The Story of the National Forests. Doubleday, Garden City, NJ.

Gladics, F.M., 1991. The Forest Service: an agency in transition. National Forest Products Assoc., Washington, DC.

Gold, K.A., 1982. Managing for success: a comparison of the private and public sectors. Public Admin. Rev. 42, 568–575.

Greeley, W.B., 1951. Forests and Men. Doubleday, Garden City, NJ.

Gulick, L.H., 1951. American Forest Policy. Duell, Sloan and Pearce, New York.

Hays, S., 1959. Conservation and the Gospel of Efficiency. Harvard Univ. Press, Cambridge, MA.

Jensen, M.E., Bourgeron, P.S. (Eds.), 1993. Eastside forest ecosystem health assessment: ecosystem management, principles and applications, Vol. II. USDA Forest Service, Washington, DC.

Kaufman, H., 1960. The Forest Ranger. Johns Hopkins Univ. Press, Baltimore, MD.

Kennedy, J.J., 1981. A view of New Zealand forestry in 'mid-life' transition. NZ J. For. 26, 43–54.

Kennedy, J.J., 1985. Conceiving forest management as providing for current and future social value. For. Ecol. Manage. 13, 121–132.

Kennedy, J.J., 1988. Legislative confrontation of groupthink in US natural resources agencies. Environ. Conserv. 15, 123–128.

Kennedy, J.J., 1991. Integrating gender diverse and interdisciplinary professionals into traditional US Department of Agriculture–Forest Service culture. Soc. Nat. Resour. 4, 165–176.

Kennedy, J.J., Quigley, T.M., 1989. How entry-level employees, forest supervisors, regional foresters and chiefs view Forest Service values and the reward system. USFS Sunbird Conference Report. USDA Forest Service, Washington, DC.

Kennedy, J.J., Thomas, J.W., 1992. Exit, voice and loyalty of wildlife biologists in public natural resource/environmental agencies. In: Mangum, W.R. (Ed.), American Fish and Wildlife Policy: The Human Dimension. Southern Illinois Press, Carbondale, pp. 221–238.

Kennedy, J.J., Thomas, J.W., 1995. Managing natural resources as social value. In: Knight, R.L., Bates, S.F. (Eds.), A New Century for Natural Resource Management. Island Press, Washington, DC, pp. 311–321.

Kennedy, J.J., Krannich, R.S., Quigley, T.M., Cramer, L.A., 1992. How Employees View the USDA Forest Service Value and Reward System. Department of Forest Resources, Utah State University, Logan.

Kessler, W.B., Salwasser, H., Cartwright, C.W. Jr, Caplan, J.A., 1992. New perspectives for sustainable natural resources management. Ecol. Appl. 2, 221–225.

Magill, A.W., 1988. Natural resource professionals: the reluctant public servants. Environ. Prof. 10, 295–303.

McGee, W.J., 1910. Scientific work of the Department of Agriculture. Pop. Sci. Monthly 76, 521–531.

McQuillan, A.G., 1992. From Pinchot to postmodernism: the circular century of US forestry. Inner Voice 4, 10–11.

Office of Technological Assessment, 1990. Forest Service planning: setting strategic direction under RPA, OTA-F-441. Congress of the United States, Washington, DC.

Office of Technological Assessment, 1992. Forest Service planning: accommodating uses, producing outputs and sustaining ecosystems, OTA-506. Congress of the United States, Washington, DC.

Overbay, J.C., 1992. Ecosystem management. Paper at National Workshop on Taking an Ecological Approach to Management, Salt Lake City, UT. USDA Forest Service, Chief's Office, Washington, DC.

Quigley, T.M., 1989. Value shifts in multiple-use products from rangelands. Rangelands 11, 275–279.

Reich, C., 1962. Bureaucracy and the Forests. Center for Study of Democratic Institutions, Santa Barbara, CA.

Robertson, F.D., 1991. The next 100 years of national forest management. USDA Forest Service, Chief's Office, Washington, DC.

Rolston, J., Coufal, J., 1991. A forest ethic and multivalue forest management. J. For. 89, 35–40.

Schiff, A.L., 1966. Innovation and administrative decision making: the conservation of land resources. Admin. Sci. Q. 11, 1–30.

Steen, H.K., 1976. The US Forest Service: A History. Univ. of Washington Press, Seattle.

Taylor, F.W., 1957. Principles of Scientific Management. Harper, New York.

Toffler, A., 1970. Future Shock. Random House, New York.

Twight, B.W., 1983. Organizational Values and Political Power: the Forest Service and the Olympic National Park. Pennsylvania State Univ. Press, University Park.

Twight, B.W., 1985. The Forest Service mission: a case of family fidelity. Women For. 1, 5–7.

Twight, B.W., Lynden, F.J., 1989. Measuring Forest Service bias. J. For. 87, 35–41.

US Senate, 1970. A university view of the Forest Service. Bolle Report: Senate Doc. 115. US Government Printing Office, Washington, DC.

USDA Forest Service, 1970. Framework for the Future: Forest Service Objective and Policy Guides. Washington, DC.

USDA Forest Service, 1974. Guide for Managing the National Forests in the Ozarks. Washington, DC.

USDA Forest Service (Region 9), 1985. Working Together for Multiple-Use—IRM: Integrated Resource Management. Eastern Region, Milwaukee, WI.

USDA Forest Service, 1986. Caring for the Land and Serving People, FS-402. Washington, DC.

USDA Forest Service, 1987. Workforce 1995: Strength Through Diversity. Washington, DC.

USDA Forest Service, 1990. The Forest Service Program for Forest and Rangeland Resources: Summary Recommended 1990 RPA Program. Washington, DC.

USDA Forest Service, 1992. The Forest Service Manual. Washington, DC.

USDA Forest Service, 1994. The Forest Service Ethics and Course to the Future, FS-567. Washington, DC.

USDA Forest Service, 1996. The Forest Service Program for Forest and Rangeland Resources: Summary Recommended 1996 RPA Program. Washington, DC.